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FLOOD INSURANCE STUDY

ORIGINAL

CITY OF PETERSBURG, ILLINOIS

MENARD COUNTY

SEPTEMBER 18, 1986

Federal Emergency Management Agency

COMMUNITY NUMBER - 170506

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FLOOD INSURANCE STUDY

CITY OF PETERSBURG, MENARD COUNTY, ILLINOIS

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the City of Petersburg, Menard County, Illinois, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound flood plain management. Minimum flood plain management requirements for participation in the National Flood Insurance Program are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the state (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers (COE), Rock Island District (the Study Contractor) for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-E-1153, Project Order No. 1. This study was completed in April 1985.

1.3 Coordination

At the direction of the Project Officer, no time and cost meeting was held for this study. Results of the hydrologic analysis were coordinated with the Illinois Department of Transportation, Division of Water Resources, and the Illinois State Water Survey Data Repository. Community officials have been provided a copy of this study for review.

On October 29, 1985, the results of this Flood Insurance Study were reviewed and accepted at a final coordination meeting attended by representatives of the Study Contractor, FEMA, and the community.

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2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the City of Petersburg, Menard County, Illinois. The area of study is shown on the Vicinity Map (Figure 1).

Flooding caused by overflow of the Sangamon River was studied in detail within the community.

The areas studied were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through April 1990. The scope and methods of study were proposed to and agreed upon by FEMA and the City of Petersburg.

2.2 Community Description

The City of Petersburg is located in central Menard County, in central Illinois. The total area contained within the corporate limits is approximately 1.5 square miles. Petersburg is surrounded by unincorporated areas of Menard County and is situated approximately 20 miles northwest of the City of Springfield, Illinois. Petersburg is served by State Routes 123 and 97. According to the 1980 U.S. Census Bureau figures, the population of Petersburg is 2,632 (Reference 1).

Menard County has hot summers and cold winters, a continental climate typical of central Illinois. Annual precipitation averages 34 inches with about half of the annual precipitation normally falling during the growing season from May through September. The highest recorded rainfall for a single 24-hour period was 5.12 inches September 26, 1959. Annual snowfall averages 24 inches. The average daily winter minimum temperature is 21 degrees Fahrenheit (F.). The coldest temperature recorded was -22 degrees F. on February 26, 1963. July is the hottest month. The highest recorded temperature was 112 degrees F. on July 14, 1954 (Reference 2).

Development within the flood plain is mainly single-family residential and commercial.

2.3 Principal Flood Problems

Flood damage in Petersburg results from flooding on the Sangamon River, generally associated with spring snowmelt combined with heavy rain storms. The largest flood on this reach of the Sangamon River occurred in the spring of 1943 with an approximate discharge of 68,000 cubic feet per second (cfs). This flood had an approximate recurrence interval of over 500 years based on discharge-frequency data presented in this study.

2.4 Flood Protection Measures

Within the City of Petersburg, there are no existing or proposed flood control projects. However, the city does have restrictions in its zoning ordinance and building permit requirements concerning development in the flood plain.

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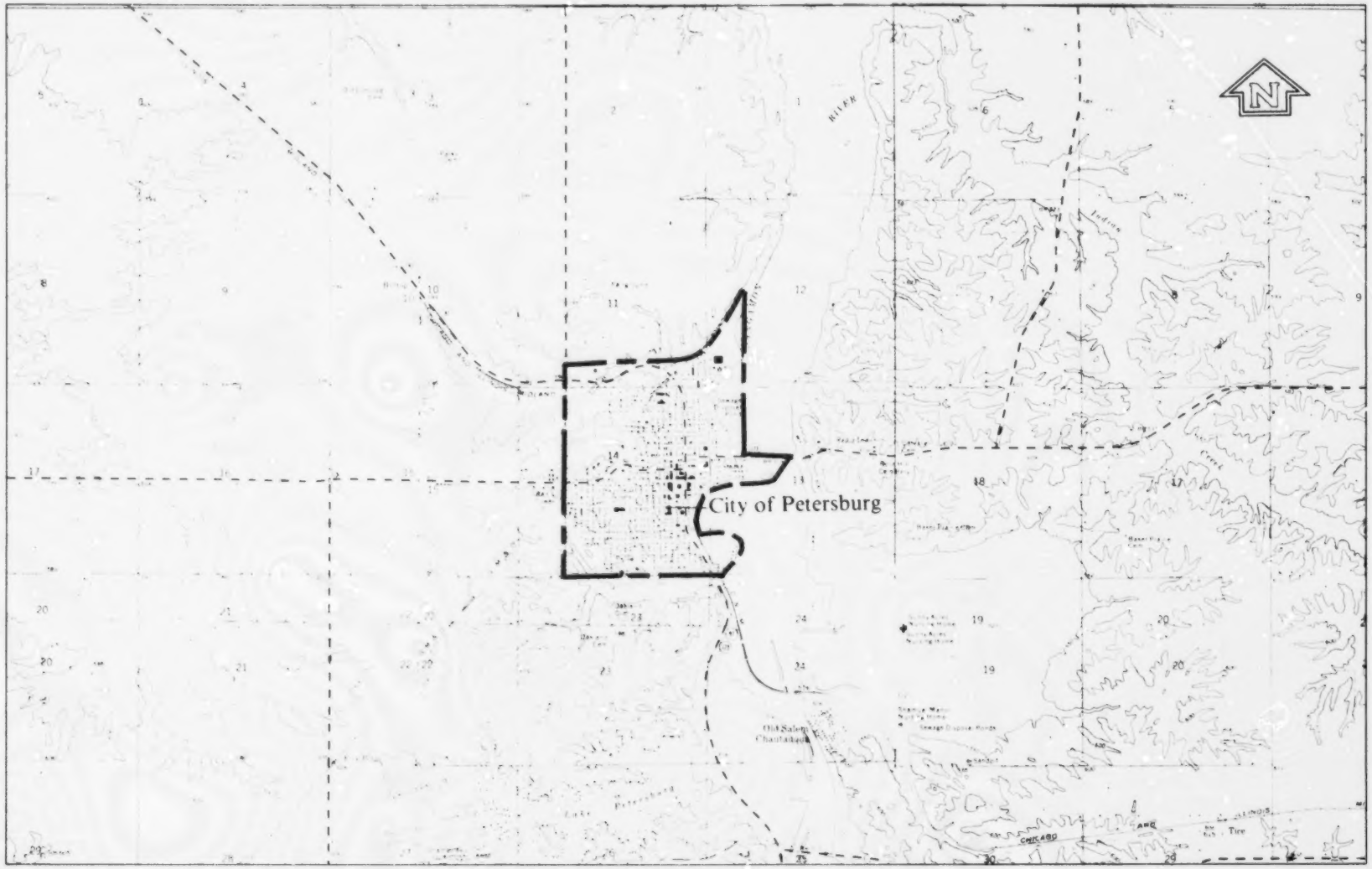

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, IL
(MENARD CO.)

APPROXIMATE SCALE
4000 0 4000 8000 12000 FEET

VICINITY MAP

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3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude that are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood that equals or exceeds the 100-year flood (one-percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each riverine flooding source studied in detail affecting the community.

A flow frequency analysis at U.S. Geological Survey (USGS) gage No. 05576500 at Riverton was computed using Bulletin No. 17B with 67 years of record (Reference 3). USGS Gage No. 0557800 at Petersburg could not be used due to inadequate flow. Therefore, a weighting technique developed by the USGS was used to compute the 10-, 50-, 100-, and 500-year flows for the Sangamon River at Petersburg (References 4 and 5).

Peak discharges for the 10-, 50-, 100-, and 500-year floods of each flooding source studied in detail in the community are shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (SQ MILES)	PEAK DISCHARGE (CFS) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
SANGAMON RIVER at USGS Gage No. 0557800	3,063	33,075	46,300	51,475	62,300

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

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Cross sections for the Sangamon River hydraulic analysis were obtained by combining a 1984 field survey of the channel with 2-foot contour mapping for the overbank areas (Reference 6). Elevations and structural geometry for the new State Highway 123 bridge crossing the Sangamon River were obtained using project plans and drawings (Reference 7).

Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles. For stream segments for which a floodway was computed (Section 4.2), selected cross-section locations are also shown on the Flood Insurance Rate Map.

All hydraulic analyses were made using the COE HEC-2 step-backwater computer program (Reference 8). Starting water-surface elevations for the Sangamon River were based on normal depth computations. Channel and overbank roughness coefficients for the hydraulic computations (Manning's "n") were assigned on the basis of field inspection, analysis of photographs, and professional experience. The "n" values used for the Sangamon River in the study area were 0.034 in the channel and 0.06 to 0.1 in the overbanks.

Flood profiles were drawn showing the computed water-surface elevations for floods of the selected recurrence intervals. In cases where the 50- and 100-year flood elevations are close together, due to limitations of the profile scale, only the 100-year profile has been drawn.

The hydraulic analyses for this study are based only on the effects of unobstructed flow. The flood elevations shown on the profiles are, thus, considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the National Geodetic Vertical Datum of 1929 (NGVD). Elevation reference marks used in this study are shown on the map and described in the exhibit labeled Elevation Reference Marks.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year flood plain boundaries and 100-year floodway to assist communities in developing flood plain management measures.

4.1 Flood Boundaries

To provide a national standard without regional discrimination, the one-percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 0.2-percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year flood plain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps with a scale of 1:2400, with a 2-foot contour interval (Reference 6).

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The 100- and 500-year flood plain boundaries are indicated on the Flood Insurance Rate Map. On this map, the 100-year flood plain boundary corresponds to the boundary of the areas of special flood hazards (Zones A, AE, AH, AO, A99, V, and VE) and the 500-year flood plain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100-and 500-year flood plain boundaries are close together, only the 100-year flood plain boundary has been shown. Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

4.2 Floodways

Encroachment on flood plains, such as structures and fill, reduces the flood-carrying capacity, increases the flood heights and velocities, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood plain is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights. Minimum Federal standards limit such increases to 1.0 foot, provided that hazardous velocities are not produced. In Illinois though, under Revised Statutes, Section 65f, Chapter 19, as amended in 1973 (Reference 9), encroachment in the flood plain is limited to that which will cause only an insignificant increase in flood heights. Thus, at the recommendation of the Illinois Division of Water Resources, a floodway having no more than a 0.1-foot surcharge has been delineated for this study.

The floodways presented in this study were computed for certain stream segments on the basis of equal conveyance reduction from each side of the flood plain. Floodway widths were computed at cross sections. Between cross sections, the floodway boundaries were interpolated. The results of the floodway computations are tabulated for selected cross sections and are shown in Table 2, Floodway Data. The computed floodways are shown on the Flood Insurance Rate Map. In cases where the floodway and the 100-year flood plain boundaries are either close together or collinear, only the floodway boundary is shown. Portions of the floodway for the Sangamon River lie outside the corporate limits.

The area between the floodway and the 100-year flood plain boundaries is termed the floodway fringe. The floodway fringe encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 0.1 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 2.

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FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQ. FEET)	MEAN VELOCITY (FEET/SEC.)	REGULATORY (FEET NGVD)	WITHOUT FLOODWAY (FEET NGVD)	WITH FLOODWAY (FEET NGVD)	INCREASE (FEET)
SANGAMON RIVER								
A	12,230	2283	27,790	1.9	503.6	503.6	503.7	0.1
B	13,960	2189	16,088	3.2	503.8	503.8	503.9	0.1
C	14,900	2146	19,553	2.6	504.1	504.1	504.2	0.1
D	15,710	2576	24,791	2.1	504.4	504.4	504.5	0.1
E	17,600	2770	30,560	1.7	504.8	504.8	504.9	0.1
F	19,000	3106	31,332	1.6	504.9	504.9	505.0	0.1
G	20,850	2635	29,812	1.7	505.2	505.2	505.3	0.1

[1]FEET ABOVE ILLINOIS CENTRAL GULF RAILROAD

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, IL

(MENARD CO.)

FLOODWAY DATA

SANGAMON RIVER

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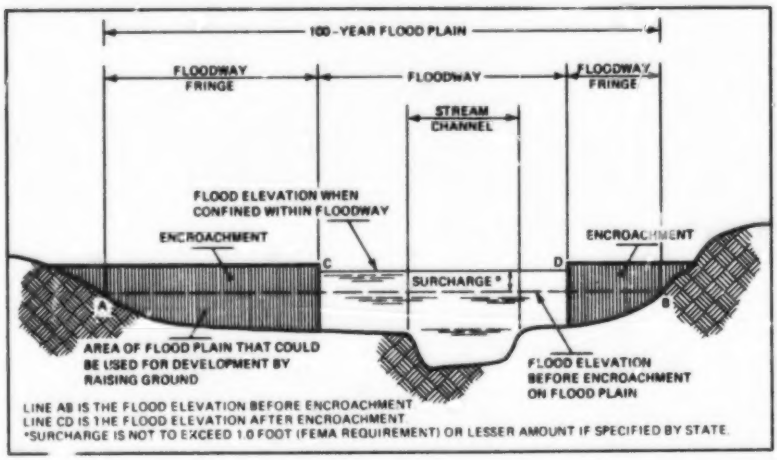
100-YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
SURCHARGE *
A
B
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE AB IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE CD IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE IS NOT TO EXCEED 1.0 FOOT (FEMA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FIGURE 2 - Floodway Schematic

The floodways in this study are presented to local agencies as minimum standards that can be adopted directly or that can be used as a basis for additional floodway studies.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year flood plains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year flood plain, areas within the 500-year flood plain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and flood plain management applications.

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For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year flood plains that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For flood plain management applications, the map shows by tints, screens, and symbols the 100- and 500-year flood plains, the floodways, and the locations of selected cross sections used in the hydraulic analyses and floodway computations.

7.0 OTHER STUDIES

The COE published an Inventory Analysis of Urban Water Problems in the City of Petersburg (Reference 10). The water-surface profiles for the Sangamon River presented in the above report were determined by approximate methods and are superseded by this Flood Insurance Study.

Due to its more detailed analysis, this Flood Insurance Study supersedes the previously printed Flood Hazard Boundary Map for the City of Petersburg (Reference 11).

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, 300 South Wacker Drive, Chicago, Illinois 60606.

9.0 REFERENCES AND BIBLIOGRAPHY

1. U.S. Department of Commerce, Bureau of the Census, 1980 Census of Population, Number of Inhabitants, Illinois, Washington, D.C., February 1982.

2. U.S. Department of Agriculture, Soil Conservation Service, Soil Survey of Sangamon County, Illinois, May 1972.

3. Interagency Advisory Committee on Water Data, Bulletin No. 17B Guidelines for Determining Flood Flow Frequency, September 1981.

4. U.S. Geological Survey, Water Resources Investigations 77-117, Techniques for Estimating Magnitude and Frequency of Floods in Illinois, G.W. Curtis, 1977.

5. U.S. Army Corps of Engineers, Rock Island District, Regionalized Skew Study for the Illinois River Basin, 1981.

6. U.S. Army Corps of Engineers, Chicago District, Mapping for Oakley Lake and Channel Improvements Sangamon River, Illinois Greenbelt Area, Scale 1:2400, Contour Interval 2 feet, 1971.

7. U.S. Department of Transportation, Division of Highways, Plans for Proposed Federal Aid Highway, F.A.P., Route 737 (IL Route 123), Section 1 (X-1, B-1), Project No. BR-F-737, Menard County, Illinois, C-96-051-83.

8. U.S. Army Corps of Engineers, Hydrologic Engineering Center, HEC-2 Water-Surface Profiles, January 1981.

9. Illinois Department of Transportation, Division of Water Resources, Rules and Regulations, Regulation of Construction Within Flood Plains Established Pursuent to Section 65f, Chapter 19; Illinois Revised Statutes, Springfield, Illinois, 1973.

10. U.S. Army Corps of Engineers, Inventory Analysis of Urban Water Problems, Menard County, Illinois, undated.

11. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, City of Petersburg, Menard County, Illinois, March 1976.

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ELEVATION REFERENCE MARKS
CITY OF PETERSBURG

REFERENCE MARK	FLOOD INSURANCE RATE MAP PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
1	0001	504.38	railroad spike in southwest side of power pole located on southeast corner of Douglas Avenue and Third Street

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FLOOD PROFILES

SANGAMON RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

CITY OF PETERSBURG, IL

(MENARD CO.)

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